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fork which was well screened by the foliage, and began to break off small branches and pile them loosely in the crotch. There was no attempt at weaving, nor even regularity in anything. He reached out his long, hairy arm, snapped off the leafy branches with a practiced hand, and laid them down with the broken ends sticking out. He presently got on the pile with his feet, and standing there to weight it down he turned slowly, breaking branches all the while and laying them across the pile in front of him, until he had built quite a large nest. When he had finished he laid down upon it, and was so effectually screened from us that I could not dislodge him, and after two or three shots I told the natives they would have to cut the tree." During one day's travel along the Upper Simujan river, Mr. Hornaday counted thirty-six old nests and six which were regarded as new or fresh. He thinks that an orang after building a nest sleeps in it several nights in succession, unless he leaves its neighborhood altogether. He never saw nor heard of any house-building by orang-utans, though he was led to believe that some individuals may have a habit of covering their bodies with branches for protection against the dashing of the rain drops during a heavy storm. "My little pet orang," he says, "would invariably cover his head and body with straw or loose clothing the moment it began to rain, even though he was under a roof."

Forty-three orangs were shot by Mr. Hornaday and his hunters, and of these seven exceeded the maximum height as given by Mr. Wallace, viz., four feet two inches. "My tallest *Simia wurbii* or 'mias chappin,' measured four feet six inches from head to heel, and the next in size four feet five and a half inches. Then a *satyrus*, or 'mias rombi,' measured four feet four and a half inches, two other *wurbii* four feet four inches, and four feet three inches respectively, a *satyrus* four feet three inches, and a *wurbii* four feet two and a half inches."

The account of the gibbons and other animals of Borneo, its forests and of the Dyaks are interesting—indeed there is not a dull page in the book. Besides the general map there is an ethnographic map of Borneo, showing the distribution of the Dyak tribes and subtribes, as classified by the author. Much ethnographic material is given, with frequent illustrations. We see little in point of fact to criticise, except where the author speaks of nummulites as "little flat echinoderms."

GOODALE'S VEGETABLE PHYSIOLOGY.¹—Early in the past year we had the pleasure of noticing the first part of this work, which is now completed by the appearance of Part II. The chapters in the part before us deal successively with, Protoplasm in its rela-

¹ *Gray's Botanical Text-Book* (Sixth Edition), Vol. II. Physiological Botany. II. Vegetable Physiology. By GEORGE LINCOLN GOODALE, A.M., M.D., Professor of Botany in Harvard University. Ivison, Blakeman, Taylor & Company, New York and Chicago, 1885. pp. xxi. 195 to 500+36. Illustrations 142 to 214.

tions to its surroundings; diffusion, osmosis and absorption of liquids; soils, ash constituents, and water culture; transfer of water through the plant; assimilation; changes of organic matter in the plant; vegetable growth; movements; reproduction; the seed and its germination; resistance of plants to untoward influences. The whole volume thus covers the field of the general anatomy and physiology of plants, and especially of the flowering-plants.

In looking over the chapters one is struck with the fact that in them much new material has been brought for the first time before the American student. There is thus a freshness about much of the matter which adds greatly to its interest. The treatment, too, is sufficiently different to distinguish the book at once from others covering the same general ground. Very naturally the work has much of the German method in it. In fact a great part of the matter is the result of work done in German laboratories.

A noticeable feature of the book is its wider range of subjects than is usual in botanical works. There is much in it which we are accustomed to consider as belonging to agriculture and agricultural chemistry. This feature will commend the book to the teachers and students in our agricultural colleges. We have thus in chapter VIII such topics as the following taken up and discussed at some length, viz: Formation of soils; classification of soils; condensation of gases by soils; temperature of soils; etc., etc. In chapter XVI we have discussed the following practical topics, viz: Winter killing; improper food; noxious gases; liquid and solid poisons; mechanical injuries.

The chapters which interest us most are the tenth, eleventh and twelfth, devoted respectively to assimilation, change of organic matter in the plant, and vegetable growth. In the first there is some danger of confusion from the double sense in which the word assimilation is used, viz: 1, For the conversion of all food-matter (in which sense it is employed in the heading to the chapter and headings of the pages throughout the chapter), and 2, the appropriation of carbon. This last is called assimilation proper (p. 285), and a few lines further on the statement is made that "the term *assimilation* in the following pages will be made to refer to the appropriation of carbon." Aside from this confusion of terms, the treatment is exceedingly satisfactory. In the eleventh chapter the word transmutation is used in place of the usual one, metastasis, or the less usual one, metabolism. This appears to us to be a desirable improvement in the nomenclature of the subject.

The chapter on vegetable growth brings before the student the latest results of the German investigators, and this is done in so clear and concise a manner as to leave nothing to be desired. The author has sifted the great mass of literature upon this subject and given in summary form the results.

The illustrations throughout the volume are drawn mainly from

the publications of Pfeffer, Sades, Darwin and others, and in many cases have been reduced in size by the publishers so as to give them a better appearance upon the octavo pages. The printer's work has been well done, and the book has an attractive appearance.—*Charles E. Bessey.*

WOOD'S NATURE'S TEACHINGS.¹—Mr. Wood has written a good many books on zoölogical subjects, all useful, but none of them particularly profound or especially inspiring, but we think that in the present case he has produced a most readable book. The object of the writer is to show the close connection between the actions of the different organs of animals and plants and human inventions, and to prove that there is scarcely an invention by man which has not its prototype in nature. The author has placed side by side a great number of parallels of nature and art, with terse, brief descriptions, and illustrated with a great number of original sketches. As a result, we have just the book to put into the hands of a boy, not only serving to interest him but to lead him to observe the common objects of nature; and grown-up people will also, if we mistake not, relish its pages and illustrations. The author draws the corollary from the facts presented, "that as existing human inventions have been anticipated by nature, so it will surely be found that in nature lie the prototypes of inventions not yet revealed to man."

As examples, the raft with its sail is anticipated by the Velella; the boat by the gnat-egg boat, the floating sea-anemone, or water-sail or pupa-skin of the mosquito; and the boatman in his boat by the "water-boatman," or Notonecta. Examples of paddle-wheels are seen in those of the Ctenophores, and the movements of the tail of the fish anticipate those of the propeller. The arrangement of the ribs of a fish are like those of a vessel, while the form of a ship's anchor is outlined in the spicule of the Synapta, and that of a grapnel in the spicules of sponges and Echinococcus; ice-anchors and ice-hooks are anticipated by the tusks of the walrus; an eagle's claw presages a flesh-hook, and the grapple-plant the ordinary drag; boat-hooks are typified in the pushing spikes of sea worms; Captain Boynton's life-dress in the float of a Portuguese man-of-war, and Janthina's raft in a cask-pontoon. Under the caption of war and hunting, pitfalls are shown to be but an imitation of that of the ant-lion, and poisoned arrows of the fangs of serpents and the stings of insects. Barbed spears, harpoons and arrows have multitudes of semblances in nature, as do projectiles of all descriptions. Nets, traps, defences of all sorts, armor of varied description, forts, scaling implements, tunnels, as well as the houses of savages, and the porches, eaves, windows, thatch, slates and tiles of civilized architecture, with

¹ *Nature's Teachings.* Human inventions anticipated by Nature. By Rev. J. G. Wood, with upwards of 750 engravings. Boston, Roberts Brothers. 12mo, pp. 533.